## REMARKS

Applicants respectfully request reconsideration of this application, and reconsideration of the Office Action dated April 7, 2004 (Paper No. 9). Upon entry of this paper, claims 1-20 will remain pending in this application. The changes to claim 1 are fully supported by the specification. No new matter is introduced as a result of this Amendment.

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Claim 1 is rejected under 35 U.S.C. 103(a) as purportedly obvious based on Darcie et al. (U.S. Pat. No. 5,680,234) in view of Beller (U.S. Pat. No. 6,388,741). Applicants respectfully traverse this rejection.

Applicants first describe Darcie's invention as described in the patent. Darcie has a central office 13 and many ONUs 26 with a remote node 22 (WGR 100) intervening between the central office 13 and ONUs 26. The central station has two optical fibers 21 and 23, fiber 21 being a downstream fiber and fiber 23 being an upstream fiber. Every ONU has two optical fibers 24 and 25 with the fibers 25 being upstream fibers and the fibers 24 being downstream fibers. The remote node 22 (WGR 100) couples the downstream fiber 21 periodically to one of the downstream fibers 24 and the upstream fiber 23 periodically to one of the upstream fibers 25. Darcie's ONU has an exclusive upstream fiber 25 for carrying center/ONU signals and another exclusive downstream fiber 24 for carrying center/ONU signals. An ONU LED is coupled to the upstream fiber 25 for transmitting upstream signals. A receiver (Photodiode) PCVR 28 of the ONU is coupled to the downstream fiber 24. The upstream fiber 25 is reversely coupled to the downstream fiber 24 by a coupling device 34.

The coupling device 34 is important. Column 5, lines 11 – 16 of Darcie reads,

> "The coupling device 34, which may suitably be a 90/10 optical coupler or other asymmetric optical coupler, is configured to couple the downstream fiber 24 with the upstream fiber 25. This allows signals propagating downstream to be coupled onto the upstream fiber 25."

Hence, the coupling device is, for example, a 90/10 asymmetric coupler. This means 90% of light power goes directly through to the same fiber without crossing and 10% pass over to the other fiber with crossing. In other words, direct power is 90% and crossing power is 10% in Darcie's coupling device 34.

A transmitting signal (1.5 μm), which is made by the LED 17, runs in the upstream fiber 25 in the rightward direction and goes to the coupling device 34. Then, 10% of the light goes into the downstream fiber 24. Without more, extensive crosstalk would occur between a transmitting part and a receiving part by injection of the LED-light to the ONU RCVR (Photodiode). A reverse blocking filter 41 thus is interposed between the coupling device 34 and the PCVR 28. The 10% LED-emitted downstream light is screened by the reverse blocking filter 41. The reverse blocking filter 41 passes 1.3 μm but blocks 1.5 μm. The reverse blocking filter 41 prevents the LED-light from going into the PCVR (ONU PD). Invasion of the LED-light to the PCVR is "crosstalk". The reverse blocking filter 41 protects the ONU from crosstalk. Column 5, lines 16 – 18 in Darcie states, "The ONU 26 may further include a diagnostic blocking filter 40 and a reverse blocking filter 41 located between the coupling device 34 and the receiver 28."

On the contrary, 90% of the LED-emitted light remaining in the upstream fiber 25 runs into the remote node 22 (WGR 100), goes into the upstream fiber 23, arrives at the center receiver (center PD) PCVR. 16 and makes an electric upstream signal in the central office 13.

The above describes the propagation of a transmitting signal which is produced by the LED 17. A downstream signal, which is made by the central LED 14, goes into the downstream fiber 21, enters the WGR 100 in the remote node 22, goes in the downstream fiber 24, makes its way into an ONU 26, and arrives at the coupling device 34. The optical central LED-signal is divided by the coupling device 34. Thus, 90% of the optical central-signal goes directly into the downstream fiber 24, passes the diagnostic blocking filter 40 and the reverse blocking filter 41, arrives at the photodiode RCVR 28, and results in an electric central-signal. That leaves 10% of

the central-signal that crossly enters into the upstream fiber 25; this also is important. The 10% optical central LED-signal returns to the central office PCVR 16 via the WGR 100 on the remote node 22, the upstream fiber 23, and the coupler 33. The remaining 10% returning power will induce serious "crosstalk" between the transmitting part 14 and the receiving part 16 in the central office. Darcie has a drawback in that crosstalk occurs at the central office by the recurrent light from the central LED 14 via fibers 21, 24, the coupling device 34 via fibers 25, 23 and to the receiver 16. Darcie places the reverse blocking filter 41 on the ONU light path for preventing ONU crosstalk. But Darcie is indifferent to the central crosstalk. Darcie does not place a counterpart blocking filter in the central light path following the upstream fiber 23. The above describes the operation of ordinary reciprocal exchange of signals between the central office and the ONUs.

In the case of diagnostics, the central office makes a diagnostic wavelength by the DIAG 30. The diagnostic light propagates in the downstream fiber 21, arrives at the remote node 22 (WGR 100), selectively goes into one downstream fiber 24, reaches the coupling device 34. Hence, 90% of the diagnostic light goes directly on the downstream fiber 24. The 90% diagnostic light, however, is entirely attenuated by the diagnostic blocking filter 40. No diagnostic light reaches the ONU receiver RCVR 28. Then, 10% of the diagnostic light crosses the coupling device 34, runs in the upstream fiber 25, arrives at the WGR 100, goes into the upstream fiber 23 in the central office, crosses the filter 33, and arrives at the central DIAG 32. The diagnostic light propagates in an open loop consisting of the DIAG 30, coupler 31, fiber 21, fiber 24, coupling device 34, fiber 25, fiber 23, coupler 33, and DIAG 32. The upstream path (34, 25, 22, 23, 33) is different from the downstream path (21, 22, 24, 34) for the diagnostic light. Only 10% of the diagnostic light is effectively used for diagnostic. Thus, 90% of the diagnostic light is eliminated. The diagnostic blocking filter 40 annihilates 90% of the diagnostic light in Darcie. The key element 34 is not a grating reflector but a 90:10 coupler in Darcie. Employment of a 90:10 coupler brings many inconveniences in Darcie. Darcie's 90:10

requires the diagnostic blocking filter 40 and the reverse blocking filter 41 appearing in Fig. 1 of Darcie. The diagnostic blocking filter has a role of allowing receiving signal light (1.3 μm) to pass but preventing the rightward propagating diagnostic light from arriving at the receiver 28. If the diagnostic light reached the receiver 28, unpleasant noise would be induced in the ONU. The diagnostic blocking filter, which has complex wavelength selectively, should be produced by piling two sets of multiple layers of thin dielectric films, for example, one hundred layers to two hundred layers. The production of a diagnostic blocking filter such as filter 40 is difficult. Therefore such a diagnostic blocking filter is very expensive. Moreover, such a dielectric diagnostic blocking filter is bulky. Mounting of such a dielectric diagnostic blocking filter thus enlarges the size, cost and weight of an ONU in Darcie.

The following reverse blocking filter 41 has a role of allowing receiving signal light (1.3 μm) to pass but absorbing/reflecting the transmitting signal light (1.5 μm) for preventing the LED-emitting transmitting signal from entering the receiver 28. If the LED-emitting light went into the receiver, LD/PD crosstalk would occur. If the transmitting light (1.5 μm) would reach the receiver 28, unpleasant noise would disturb the ONU operation. The transmitting light should be tightly shut from the receiver 28. Thus the reverse blocking filter, which is made by piling two sets of multiple thin films on a transparent substrate, likewise raises cost. The filter is bulky. Mounting of a dielectric reverse blocking filter such as filter 41 likewise raises the cost, weight and size of an ONU in Darcie. The present invention dispenses with the reverse blocking filter and the diagnostic blocking filter.

A coupler is different from a reflector. A coupler, which is placed at 2X2 fiber branches, divides light into two fibers at a definite rate. A reflector, which is placed midway in a single fiber, is an element for reflecting light back in the counter-direction. The roles, functions and structures are entirely different between a coupler and a reflector. In addition, Applicants' fiber grating is not only a simple reflector but also a special wavelength-selective reflector. Applicants' fiber grating 63, 70, 71, 93 in Figs. 10, 11, 12, 13 are of one kind of reflector, but

fiber grating 63, 70, 71 are also wavelength selective reflectors. Darcie's diagnostic light propagates in an open loop. In contrast, Applicants' diagnostic light goes in a fiber and returns in the same fiber, and thus needs no open loop. An open loop is indispensable for Darcie, while Applicants invention is satisfied with a single fiber. In the case of Fig. 9 of a single PD or LD 60 of the present specification, detection light comes from the left in the fiber 61. The detection light is reflected by the fiber grating 63 and is reversed. The reflected detection light enters the same fiber 61, to the left. In the case of Fig. 11, three independent detection beams enter fibers 61, 61, 61, are reflected by independent fiber gratings 63, 63, 63, and returns to the left in the same fibers 61, 61, 61. In the case of Fig. 12 and the LD/PD module, two independent detection light beams are injected into independent fibers 68, 69 from the left, run in the fibers 68, 69, are reflected independently by the independent fiber gratings 70, 71 and reversely enters into the same fibers 68, 69 to the right. Even in the binary fiber PD/LD module of the present invention, the detection beams do not depict an open loop. See Fig. 12. Also, Fig. 15 of the present specification shows a single fiber PD/LD module. A detection beam runs in the fiber 105 from the left to the right, is reflected by the fiber grating 104, and returns in the same fiber 105 from the right to the left. Hence, in view of the above, the differences between Darcie and the present invention have been clarified. These differences are summarized below:

1. Specifically, Darcie uses an open loop for diagnostic propagation. Diagnostic light propagates in the downstream fibers 21, 24 and returns in the upstream fibers 25, 23. In the present invention, the detection light propagates in the same fiber in reciprocal directions.

2. Darcie uses a 90:10 coupling device. The coupling device has no reflecting function. The coupling device is made at a 2X2 path crossing point. The coupling device has a role of dividing light to the following paths. The 90:10 coupling device of Darcie allocates 90% to the same path extension and 10% to another path extension. In contrast, Applicants use a fiber grating reflector. The fiber grating reflector has a role of reflecting only a definite wavelength

but allowing other wavelengths to pass through. The fiber grating has no role of allocation. The fiber grating is a small-sized device and is simple to manufacture.

3. Darcie requires a diagnostic blocking filter, which is an expensive dielectric filter, for preventing the diagnostic light from reaching the receiver. Darcie further requires a reverse blocking filter, also a highly expensive dielectric filter, for preventing the transmitting LED light from entering the receiver. The insertion of the diagnostic blocking filter 40 and the reverse blocking filter 41 raises cost, size and weight of an ONU. Applicants dispense with both the diagnostic blocking filter and the reverse blocking filter.

4. In Darcie's invention, noise in induced by the returning central-transmitting signal from the LED 14 via fibers 21, 100, 24, 34, 25, 100, 23, 33 to the receiver 16. In contrast, the present invention is free from such noise.

Applicants have amended claim 1 to clarify that the detection light reflected by the fiber grating is propagated in the same path as the incident light. This change in claim 1(i.e. the same path for return) <u>excludes an open loop</u>. This change to claim 1 further distinguishes the claimed invention from the cited art.

The Office Action concedes that Darcie fails to disclose the use of a grating fiber. However, the Office Action asserts that Beller teaches using a grating fiber and concludes that it would have been obvious to modify the invention of Darcie by replacing Darcie's diagnostic blocking filter 40 with Beller's grating fiber . However, Applicants respectfully disagree.

The diagnostic light which is made by the DIAG 30, enters the downstream fiber 21, 24, and arrives at the coupling device 34. Specifically, 10% of the diagnostic light is transferred to the upstream fiber 25 by the coupling device 34. The 10% diagnostic light enters the upstream fibers 25, 23, passes the coupler 33, and reaches DIAG 32. DIAG 32 can judge wither the light paths are in order or out of order by the appearance or disappearance of the diagnostic light from the DIAG 32 of the central office 13. The <u>device that circulates the diagnostic light is</u> the diagnostic <u>blocking filter 40</u>. If Darcie's arrangement did not have the diagnostic blocking filter,

the diagnostic light could not circulate to the DIAG 32. The diagnostic blocking filter 40 of Darcie is not a counterpart of the fiber gratings 63, 70, 71, 93, 99 of the present invention. In Darcie's invention, the blocking filter prevents the diagnostic light from entering the ONU. Hence, the cited art fails to provide sufficient motivation to those of ordinary skill in the art to replace Darcie's diagnostic blocking filter with the grating fiber of Beller. Moreover, replacing Darcie's diagnostic blocking filter with Beller's grating would not bring Darcie's invention closer to the present invention. This is because the diagnostic blocking filter is not a reflector for circulating diagnostic light. Rather, it is the coupling device 34 of Darcie that ventilates the diagnostic light. In short, the coupling device is not identical to Applicants' reflector in function, structure or relation.

In view of the above discussion, even when considered together, Darcie and Beller fail to teach or fairly suggest the claimed invention. Hence, Applicants respectfully request that this rejection be reconsidered and be withdrawn.

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Claim 2 is rejected under 35 U.S.C. § 103(a) as obvious based on Darcie in view of Beller, and further in view of Higashi (U.S. Pat. No. 5,937,120).

Claims 17-20 are rejected under 35 U.S.C. § 103(a) as obvious based on Darcie in view of Beller, in view of Higashi, and further in view of Pimpinella (U.S. Pat. No. 5,257,332).

Claims 3, 4, 6, and 10-16 are rejected under 35 U.S.C. § 103(a) as obvious based on Darcie in view of Beller, and further in view of Komatsu (U.S. Pat. No. 6,192,170).

Claims 5 and 7-9 are rejected under 35 U.S.C. § 103(a) as obvious based on Darcie in view of Beller, and further in view of Kato (U.S. Pat. No. 5,859,945).

These four rejections are addressed together as similar issues apply to all four. Applicants traverse each rejection.

The deficiencies of Darcie and Beller are discussed above. None of the other cited patents remedy these deficiencies. None of the prior art teaches or fairly suggests Applicants'

communication device arrangement with a grating as described by claim 1. Moreover, there is nothing in the asserted prior art which would have motivated those of ordinary skill in the art to have modified the grating described by Komatsu to arrive at the claimed invention. Hence, for at least this reason, none of the asserted prior art combinations renders the claimed invention obvious.

The above remarks overcome each of the four rejections. Accordingly, reconsideration and withdrawal of all four are respectfully requested.

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If any fees are due in connection with the filing of this Amendment, such as fees under 37 C.F.R. §§ 1.16 or 1.17, please charge the fees to our Deposit Account No. 02-4300; Order No. 033035.059.

Respectfully submitted,

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